

0188

Ring data sources.  
Other aspects of this  
is, 1215 Jefferson  
SDS.

**REPORT DOCUMENTATION PAGE**

Public reporting burden for this collection of information is estimated to average 1 hour per response for gathering and maintaining the data needed, and completing and reviewing the collection of information, including suggestions for reducing this burden, to Washington Headquarters Service, Directorate of Information, Inc., Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Executive Office of the President, Washington, DC 20503.

0328

<b>1. AGENCY USE ONLY (Leave blank)</b>			<b>2. REPORT DATE</b>	<b>3. REPORT TYPE AND DATES COVERED</b>
				FINAL REPORT 30 Sep 95 - 29 Jul 96
<b>4. TITLE AND SUBTITLE</b>			<b>5. FUNDING NUMBERS</b>	
FY95 DURIP WDM Laser Sources for the Defense University (TESTBED) Research Internet Program			61103D 3484/US	
<b>6. AUTHOR(S)</b>				
Professor Henryk Temkin				
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b>			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
Dept of Electrical Engineering Colorado State University Fort Collins, CO 80523				
<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b>			<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>	
AFOSR/NE 110 Duncan Avenue Suite B115 Bolling AFB DC 20332-8050			F49620-95-1-0535	
<b>11. SUPPLEMENTARY NOTES</b>				
<b>12a. DISTRIBUTION/AVAILABILITY STATEMENT</b>			<b>12b. DISTRIBUTION CODE</b>	
APPROVED FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED				
<b>13. ABSTRACT (Maximum 200 words)</b>				
<p>The objective of this project was to define specifications of a hybrid integrated wavelength division multiplexed laser source, to identify the appropriate vendor, and to negotiate an acceptable price structure. In consultation with a number of user groups and the DUTRIP program at University of Maryland (PI: Prof Mario Dagenais) we have determined the set of specifications for the four wavelength WDM array.</p> <p>19971002 010</p>				
<b>14. SUBJECT TERMS</b>			<b>15. NUMBER OF PAGES</b>	
DTIC QUALITY IMPROVED				
<b>17. SECURITY CLASSIFICATION OF REPORT</b>		<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b>	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b>	<b>20. LIMITATION OF ABSTRACT</b>
UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED	

**Final Technical Report**

**AFOSR Contract F49620-95-1-0535  
September 30, 1995 to July 29, 1996  
Monitored by Dr. Alan Craig**

**"WDM Laser Sources for the Defense University (Testbed) Research  
Internet Program (DUTRIP)"**

**Colorado State University  
Department of Electrical Engineering  
Fort Collins, CO 80523**

**PI: Henryk Temkin  
Office: (806) 742-1264  
Email: [hTemkin@coe2.coe.ttu.edu](mailto:hTemkin@coe2.coe.ttu.edu)**

## Final Technical Report

AFOSR Contract F49620-95-1-0535  
September 30, 1995 to July 29, 1996

### **"WDM Laser Sources for the Defense University (Testbed) Research Internet Program (DUTRIP)"**

#### **I. Research**

The objective of this project was to define specifications of a hybrid integrated wavelength division multiplexed laser source, to identify the appropriate vendor, and to negotiate an acceptable price structure.

#### **II. Results**

In consultation with a number of user groups and the DUTRIP program at University of Maryland (PI: Prof. Mario Dagenais) we have determined the following set of specifications for the four wavelength WDM array:

1) Emission wavelengths of DFB lasers:

channel 1:	1549.32 nm
channel 2:	1552.52 nm (the reference of 193.1 THz.)
channel 3:	1555.75 nm
channel 4:	1558.99 nm

All channel wavelengths to be accurate to  $\pm 0.3$  nm\*

2) SMSR > 30 dB under 40 mA peak-to-peak modulation and 8.2 dB extinction ratio (SONET OC-48 spec.)

3) Threshold current ..... < 30 mA

4) External efficiency ..... >0.2 mW/mA

5) Fundamental transverse mode operation up to  $I_{DC} = 100$  mA

- 6) Power coupled into ..... > +6.0 dBm  
single mode fiber @100 mA
- 7) Modulation bandwidth ..... 2.5 Gb/s \*\*
- 8) Four ECL inputs to drivers: ECL, 25 Ω
- 9) Four single mode outputs, optical isolator in each laser package.
- 10) Back facet monitor in each laser package
- 11) Front panel setting of laser bias current and temperature for each laser.
- 12) Front panel indicator lights to indicate operation of each laser

\* All wavelengths and spectral properties measured at a chip power output of 5 mW.  
The wavelength may be trimmed with a TC cooler, as long as other specs are maintained  
\*\* modulation bandwidth is limited by the driver chip.

#### Additional Considerations

The vendor will (a) provide available test and reliability data, and (b) establish the device code and make it available to other customers at a fixed price

These specifications were discussed with a number of vendors. Ortel Corporations was identified as a low cost supplier capable of satisfying all of the above specifications.

We have also established a testing methodology for WDM arrays. The results were presented in an SPIE paper, attached.

#### **III. Personnel**

**Henryk Temkin, Professor, Principal Investigator**

**D. V. Kuksenkov, Senior Research Associate, now at Texas Tech University**